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L3: Entry 2 of 2 File: DWPI Aug 25, 2004

DERWENT-ACC-NO: 1997-358610
DERWENT-WEEK: 200456

TITLE: Pneumatic radial tyre - includes a tread with inner and outer layers of two different rubber materials

PATENT-ASSIGNEE:

ASSIGNEE	CODE
BRIDGESTONE CORP	BRID

PRIORITY-DATA: 1995JP-0310425 (November 29, 1995)

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PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 3559118 B2	August 25, 2004		006	B60C011/00
JP 09150605 A	June 10, 1997		004	B60C011/00

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP 3559118B2	November 29, 1995	1995JP-0310425	
JP 3559118B2		JP 9150605	Previous Publ.
JP 09150605A	November 29, 1995	1995JP-0310425	

INT-CL (IPC): B60C 9/08; B60C 11/00

ABSTRACTED-PUB-NO: JP 09150605A
BASIC-ABSTRACT:

In a pneumatic radial tyre with a belt layer, (1) the tread rubber layer is made up of outer and inner rubber layers that are made from different rubber materials. (2) Letting Hd be the hardness of the outer rubber layer, complex elastic modulus E' and loss tangent (tangent delta) be 100, respectively, the hardness Hd of the inner rubber layer is 80-100, its complex elastic modulus E' is 70-90, and its loss tangent (tan delta) is 80-100; (3) the radio d/D of the thickness of the inner rubber layer, d, to the thickness of the tread rubber layer, D, is distributed unevenly between both tread edges; (1) As the tread rubber layer wears, the inner rubber layer is exposed in the ground-contact area.

USE - Used for passenger cars.

ADVANTAGE - The tyre can keep control stability and ride quality nearly constant during its service life.

CHOSEN-DRAWING: Dwg.1/2

TITLE-TERMS: PNEUMATIC RADIAL TYRE TREAD INNER OUTER LAYER TWO RUBBER MATERIAL

DERWENT-CLASS: A95 Q11

CPI-CODES: A12-T01B;

ENHANCED-POLYMER-INDEXING:
Polymer Index [1.1] 018 ; H0124*R Polymer Index [1.2] 018 ; ND01 ; K9416 ; K9676*R ; K9574 K9483 ; K9712 K9676 ; K9892 ; Q9999 Q9256*R Q9212 ; Q9999 Q9234 Q9212 ; B9999 B3792 B3747 ; B9999 B4002 B3963 B3930 B3838 B3747 ; B9999 B4013 B3963 B3930 B3838 B3747 ; B9999 B5243*R B4740 ; K9905 Polymer Index [1.3] 018 ; A999 A419 ; S9999 S1672

SECONDARY-ACC-NO:
CPI Secondary Accession Numbers: C1997-115376
Non-CPI Secondary Accession Numbers: N1997-297824

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L3: Entry 1 of 2 File: JPAB Jun 10, 1997

PUB-NO: JP409150605A
DOCUMENT-IDENTIFIER: JP 09150605 A
TITLE: PNEUMATIC RADIAL TIRE

PUBN-DATE: June 10, 1997

INVENTOR-INFORMATION:

NAME	COUNTRY
KAWABATA, MISAO	
HAYASHI, KAZUO	

ASSIGNEE-INFORMATION:

NAME	COUNTRY
BRIDGESTONE CORP	

APPL-NO: JP07310425
APPL-DATE: November 29, 1995

INT-CL (IPC): B60C 11/00; B60C 9/08

ABSTRACT:

PROBLEM TO BE SOLVED: To provide a tire whose performances such as handling stability and ride comfort and the like are kept nearly constant even if the wear of the tread rubber layer is increased while the tire is running.

SOLUTION: A pneumatic radial tire comprises an outside rubber layer 41 disposed outside in a radial direction and an inside rubber layer 42 disposed inside in the radial direction. Let the hardness be Hd, the complex modulus be E', and the loss tangent tanδ of the outside rubber layer 41 be 100, respectively, and the hardness Hd, the complex modulus E', and the loss tangent tanδ of the inside rubber layer 42 are 80 to 100, 70 to 90 and 80 to 110, respectively. Moreover, the ratio d/D of the thickness (d) of the inside rubber layer 42 to the thickness D of the tread rubber layer is distributed nonuniformly in an axial direction between both sides of the tread at the cross section including the rotating axis of the tire: therefore, as the wear of the inside rubber layer is increased while the tire is running, the inside rubber layer 42 increasingly appears on the roadholding surface.

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特開平9－150605

(43)公開日　平成９年(1997)６月10日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ		技術表示箇所
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9/08		7504－3B	9/08	C	

審査請求　未請求　請求項の数３　ＯＬ　（全４頁）

(21)出願番号　特願平7－310425

(22)出願日　平成７年(1995)11月29日

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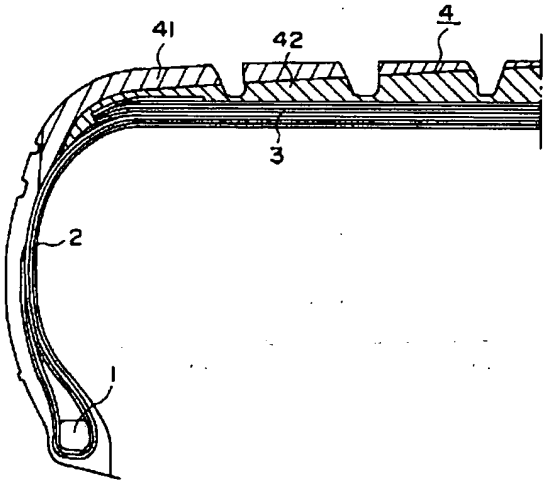
(54)【発明の名称】　空気入りラジアル・タイヤ

(57)【要約】　（修正有）

【課題】　タイヤが走行してトレッド・ゴム層の摩耗が進行しても、操縦安定性能や乗り心地性能などの性能がほぼ一定に保たれるタイヤを提供する。

【解決手段】　ラジアル方向外側に配置された外側ゴム層とラジアル方向内側に配置された内側ゴム層とで形成され、外側ゴム層のゴムの硬度Ｈｄ、複素弾性率Ｅ'および損失正接ｔａｎδの値をそれぞれ１００としたときに、内側ゴム層のゴムの硬度Ｈｄが８０乃至１００、複素弾性率Ｅ'が７０乃至９０、損失正接ｔａｎδが８０乃至１１０であり、タイヤ回転軸を含む断面において、トレッド・ゴム層の厚さＤに対する内側ゴム層の厚さｄの比ｄ／Ｄが、トレッド両側部の間で軸方向に不均一に分布していて、タイヤが走行してトレッド・ゴム層の摩耗が進行するに従って、内側ゴム層が接地面に現れる度合いが徐々に大きくなる空気入りラジアル・タイヤ。



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【特許請求の範囲】

【請求項１】　左右一対のビード部に設けられたビード・コアーと、クラウン部から両サイド部を経て両ビード部に延び、該ビード・コアーに巻回されてビード部に係留された、ラジアル・コード層よりなるカーカス・プライと、該カーカス・プライのクラウン部ラジアル方向外側に配置された、一層以上のコード層よりなるベルトと、該ベルトのラジアル方向外側に配置されたトレッド・ゴム層とを備えた空気入りタイヤにおいて、（１）該トレッド・ゴム層は、互いに異なるゴム質よりなる、ラジアル方向外側に配置された外側ゴム層とラジアル方向内側に配置された内側ゴム層とで形成され、（２）該外側ゴム層のゴムの硬度Ｈｄ、複素弾性率Ｅ’および損失正接ｔａｎδの値をそれぞれ１００としたときに、該内側ゴム層のゴムの硬度Ｈｄが８０乃至１００、複素弾性率Ｅ’が７０乃至９０、損失正接ｔａｎδが８０乃至１１０であり、（３）タイヤ回転軸を含む断面において、該トレッド・ゴム層の厚さＤに対する該内側ゴム層の厚さｄの比ｄ／Ｄが、トレッド両側部の間で軸方向に不均一に分布していて、（４）タイヤが走行して該トレッド・ゴム層の摩耗が進行するに従って、該内側ゴム層が接地面に現れる度合いが徐々に大きくなることを特徴とする空気入りラジアル・タイヤ。

【請求項２】　タイヤ回転軸を含む断面において、該トレッド・ゴム層の厚さＤに対する該内側ゴム層の厚さｄの比ｄ／Ｄが、トレッド両側部の間で、極大値と極小値を複数個備えていることを特徴とする請求項１記載の空気入りラジアル・タイヤ。

【請求項３】　タイヤ回転軸を含む断面において、該トレッド・ゴム層の厚さＤに対する該内側ゴム層の厚さｄの比ｄ／Ｄがトレッド中央部で最も大きくトレッド両側部に向かって徐々に小さくなっていることを特徴とする請求項１記載の空気入りラジアル・タイヤ。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は空気入りタイヤに関するもので、特に、左右一対のビード部に設けられたビード・コアーと、クラウン部から両サイド部を経て両ビード部に延び、該ビード・コアーに巻回されてビード部に係留された、ラジアル・コード層よりなるカーカス・プライと、該カーカス・プライのクラウン部ラジアル方向外側に配置された、一層以上のコード層よりなるベルトと、該ベルトのラジアル方向外側に配置されたトレッド・ゴム層とを備えた乗用車用の空気入りラジアル・タイヤに関するものである。

【０００２】

【発明が解決しようとする課題】従来の乗用車用空気入りラジアル・タイヤでは、タイヤが走行してトレッド・ゴム層の摩耗が進行するに従って、操縦安定性能が低下し、また、乗り心地性能も悪化する傾向があった。

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【０００３】本発明の目的は、上記のような従来技術の不具合を解消して、タイヤが走行してトレッド・ゴム層の摩耗が進行しても、操縦安定性能が極端に低下したり、乗り心地性能が極端に悪化することなく、走行初期の段階から走行末期の段階まで、操縦安定性能や乗り心地性能などの性能がほぼ一定に保たれるタイヤを提供することである。

【０００４】

【課題を解決するための手段】上記目的を達成するために、本発明の空気入りタイヤは、左右一対のビード部に設けられたビード・コアーと、クラウン部から両サイド部を経て両ビード部に延び、該ビード・コアーに巻回されてビード部に係留された、ラジアル・コード層よりなるカーカス・プライと、該カーカス・プライのクラウン部ラジアル方向外側に配置された、一層以上のコード層よりなるベルトと、該ベルトのラジアル方向外側に配置されたトレッド・ゴム層とを備えた空気入りタイヤにおいて、（１）該トレッド・ゴム層は、互いに異なるゴム質よりなる、ラジアル方向外側に配置された外側ゴム層とラジアル方向内側に配置された内側ゴム層とで形成され、（２）該外側ゴム層のゴムの硬度Ｈｄ、複素弾性率Ｅ’および損失正接ｔａｎδの値をそれぞれ１００としたときに、該内側ゴム層のゴムの硬度Ｈｄが８０乃至１００、複素弾性率Ｅ’が７０乃至９０、損失正接ｔａｎδが８０乃至１１０であり、（３）タイヤ回転軸を含む断面において、該トレッド・ゴム層の厚さＤに対する該内側ゴム層の厚さｄの比ｄ／Ｄが、トレッド両側部の間で軸方向に不均一に分布していて、（４）タイヤが走行して該トレッド・ゴム層の摩耗が進行するに従って、該内側ゴム層が接地面に現れる度合いが徐々に大きくなることを特徴とする空気入りラジアル・タイヤである。

【０００５】上記目的を達成するために、本発明の空気入りラジアル・タイヤでは、タイヤ回転軸を含む断面において、該トレッド・ゴム層の厚さＤに対する該内側ゴム層の厚さｄの比ｄ／Ｄが、トレッド両側部の間で、極大値と極小値を複数個備えていること、または、タイヤ回転軸を含む断面において、該トレッド・ゴム層の厚さＤに対する該内側ゴム層の厚さｄの比ｄ／Ｄが、トレッド中央部で最も大きくトレッド両側部に向かって徐々に小さくなっていることが好ましい。

【０００６】従来の乗用車用空気入りラジアル・タイヤでは、タイヤが走行してトレッド・ゴム層の摩耗が進行するに従って、溝深さが減少し、ブロック剛性が増加するので、操縦安定性能が低下し、また、トレッドの垂直方向の弾性定数が増加するので、乗り心地性能も悪化する傾向があった。本発明の空気入りタイヤでは、上記のように、トレッド・ゴム層は、互いに異なるゴム質よりなる、ラジアル方向外側に配置された外側ゴム層とラジアル方向内側に配置された内側ゴム層とで形成され、外側ゴム層のゴムの硬度Ｈｄ、複素弾性率Ｅ’および損失

正接ｔａｎδの値をそれぞれ１００としたときに、内側ゴム層のゴムの硬度Ｈｄが８０乃至１００、複素弾性率Ｅ’が７０乃至９０、損失正接ｔａｎδが８０乃至１１０であるので、タイヤ走行初期の段階でトレッド・ゴム層の摩耗が進行せずに、溝深さが深くブロック剛性が弱い場合は、トレッドの挙動は上記のような固めの物性値を備えた外側ゴム層の挙動が支配し、タイヤが走行末期の段階でトレッド・ゴム層の摩耗が進行し溝深さが減少し、ブロック剛性が増加すると、トレッドの挙動は上記のような柔らかめの物性値を備えた内側ゴム層の挙動が支配する。これによって、走行初期の段階から走行末期の段階まで、操縦安定性能や乗り心地性能などの性能をほぼ一定に保った優れたタイヤが得られる。

【０００７】さらに、本発明の空気入りタイヤでは、上記のように、タイヤ回転軸を含む断面において、トレッド・ゴム層の厚さＤに対する内側ゴム層の厚さｄの比ｄ／Ｄが、トレッド両側部の間で軸方向に不均一に分布していて、タイヤが走行してトレッド・ゴム層の摩耗が進行するに従って、内側ゴム層が接地面に現れる度合いが徐々に大きくなるので、走行初期の段階から走行末期の段階までの移行がスムースに行われ、ドライバーに違和感を与える恐れがない。トレッド・ゴム層の厚さＤに対する内側ゴム層の厚さｄの比ｄ／Ｄが、トレッド両側部の間で軸方向に不均一でなく、均一に分布していると、タイヤが走行してトレッド・ゴム層の外側ゴム層の摩耗が進行し突然内側ゴム層が全面的にまたはほぼ全面的に接地面に露出すると、路面グリップ性能などのタイヤ諸性能が急激に変化するので好ましくない。トレッド・ゴム層の厚さＤに対する内側ゴム層の厚さｄの比ｄ／Ｄが、トレッド両側部の間で軸方向に不均一に分布させるために、具体的には、タイヤ回転軸を含む断面において、該トレッド・ゴム層の厚さＤに対する該内側ゴム層の厚さｄの比ｄ／Ｄが、トレッド両側部の間で、極大値と極小値を複数個備えていて、いわゆる波形配置となっていること、または、タイヤ回転軸を含む断面において、該トレッド・ゴム層の厚さＤに対する該内側ゴム層の厚さｄの比ｄ／Ｄが、トレッド中央部で最も大きくトレッド両側部に向かって徐々に小さくなっていて、いわゆる配置となっていることが好ましい。

【０００８】

【発明の実施の形態】以下、本発明に従う実施例１乃至２のタイヤおよび従来例のタイヤについて図面を参照して説明する。タイヤ・サイズは、いずれも、２０５／６５Ｒ１５である。図１に示す本発明による実施例１のタイヤは、左右一対のビード部に設けられたビード・コアー１と、クラウン部から両サイド部を経て両ビード部に延び、ビード・コアー１に巻回されてビード部に係留された、２層のラジアル・コード層よりなるカーカス・プライ２と、カーカス・プライ２のクラウン部ラジアル方向外側に配置された、４層のコード層よりなるベルト３

と、ベルト３のラジアル方向外側に配置されたトレッド・ゴム層４とを備えている。トレッド・ゴム層４は、互いに異なるゴム質よりなる、ラジアル方向外側に配置された外側ゴム層４１とラジアル方向内側に配置された内側ゴム層４２とで形成されている。外側ゴム層４１のゴムの硬度Ｈｄ、複素弾性率Ｅ’および損失正接ｔａｎδの値をそれぞれ１００としたときに、内側ゴム層４２のゴムの硬度Ｈｄが９６、複素弾性率Ｅ’が８５、損失正接ｔａｎδが１０５である。タイヤ回転軸を含む断面において、トレッド・ゴム層４の厚さＤに対する内側ゴム層４２の厚さｄの比ｄ／Ｄが、トレッド両側部の間で軸方向に不均一に分布していて、タイヤが走行して該トレッド・ゴム層の摩耗が進行するに従って、内側ゴム層４２が接地面に現れる度合いが徐々に大きくなる。すなわち、図示のように、タイヤ回転軸を含む断面において、トレッド・ゴム層４の厚さＤに対する内側ゴム層の厚さｄの比ｄ／Ｄがトレッド中央部で最も大きくトレッド両側部に向かって徐々に小さくなっている。すなわち、トレッド・ゴム層４を形成する外側ゴム層４１と内側ゴム層４２との境界面が山形配置となっている。図２に示す本発明による実施例２のタイヤは、タイヤ回転軸を含む断面において、トレッド・ゴム層４の厚さＤに対する内側ゴム層４２の厚さｄの比ｄ／Ｄがトレッド両側部の間で、極大値を７個と極小値を８個備えていることを除き、上記実施例１の空気入りタイヤとほぼ同じである。実施例２のタイヤでは、トレッド・ゴム層４を形成する外側ゴム層４１と内側ゴム層４２との境界面が波形配置となっている。

【０００９】従来例の空気入りタイヤは、トレッド・ゴム層４が単一のゴム層で形成されていて、そのゴム層のゴムの硬度Ｈｄ、複素弾性率Ｅ’および損失正接ｔａｎδの値は上記の外側ゴム層４１のゴムの硬度Ｈｄ、複素弾性率Ｅ’および損失正接ｔａｎδの値と同じであることを除き、上記実施例１の空気入りタイヤとほぼ同じである。

【００１０】上記本発明に従う実施例１乃至２の空気入りタイヤと上記従来例の空気入りタイヤについて、新品時および５０％摩耗時の供試タイヤを用意し、操縦安定性能および乗り心地性能の比較試験を実施した。試験条件は、正規リム６．５Ｊ－１５に装着し、正規内圧２．２ｋｇ／ｃｍ²を充填した供試タイヤを車両に装着し、テスト・コースを走行し、試験結果はテスト・ドライバーによるフィーリング評価である。評価点数が大きいほど性能が優れていることを示す。

【００１１】操縦安定性能の試験結果では、本発明に従う実施例１乃至２のタイヤおよび従来例のタイヤについて、新品時の供試タイヤは評価点数がすべて７．０であったが、５０％摩耗時の供試タイヤは評価点数が、それぞれ、６．０、６．５および５．０であった。乗り心地性能の試験結果では、本発明に従う実施例１乃至２のタ

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イヤおよび従来例のタイヤについて、新品時の供試タイヤは評価点数がすべて7であったが、50%摩耗時の供試タイヤは評価点数が、それぞれ、6．0、6．5および5．5であった。

【0012】

【発明の効果】上記の評価結果から、本発明に基づく実施例の空気入りタイヤは従来例の空気入りタイヤと比べて、タイヤが走行してトレッド・ゴム層の摩耗が進行しても、操縦安定性能が極端に低下したり、乗り心地性能が極端に悪化することなく、走行初期の段階から走行末期の段階まで、操縦安定性能や乗り心地性能などの性能

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がほぼ一定に保たれることが分かる。

【図面の簡単な説明】

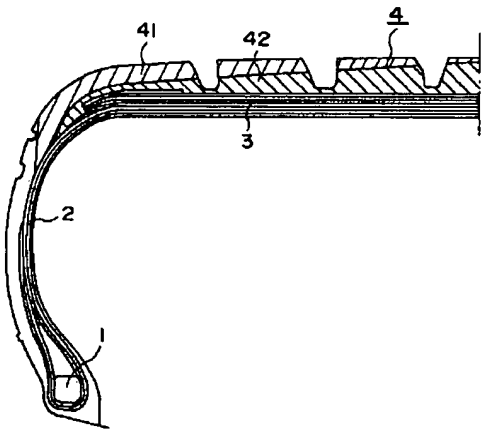
【図1】本発明による空気入りタイヤの子午線断面略図である。

【図2】本発明による空気入りタイヤの子午線断面略図である。

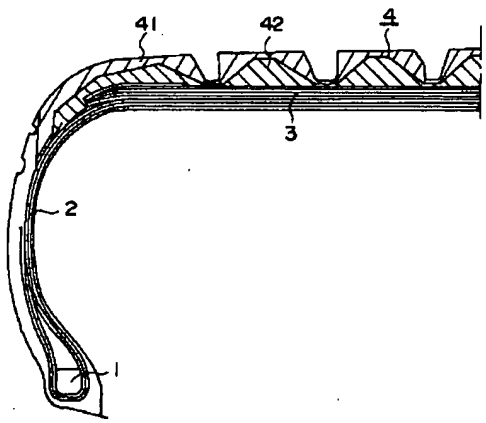
【符号の説明】

1　ビード・コアー
2　カーカス・プライ
3　ベルト
4　トレッド

【図1】



【図2】



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] The bead core by which this invention was especially prepared in the toe of bead of a right-and-left pair about the pneumatic tire, The carcass ply which was prolonged in both toes of bead through both the side section from the crown section, was wound around this bead core, and was moored to the toe of bead and which consists of a radial code layer, It is related with the radial-ply tire containing air equipped with the belt which consists of the above code layer further and the tread rubber layer arranged on the radial direction outside of this belt arranged on the crown section radial direction outside of this carcass ply for passenger cars.
[0002]
[Problem(s) to be Solved by the Invention] With the conventional radial-ply tire containing air for passenger cars, there was an inclination for driving stability ability to fall and for the degree-of-comfort engine performance to also get worse as the tire ran and wear of a tread rubber layer advanced.
[0003] The purpose of this invention is offering the tire kept almost constant [engine performance, such as driving stability ability and degree-of-comfort engine performance,] from the phase in early stages of transit to the phase of the transit last stage, without driving stability ability's falling extremely or the degree-of-comfort engine performance getting worse extremely, even if it cancels the fault of the above conventional techniques, a tire runs and wear of a tread rubber layer advances.
[0004]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the pneumatic tire of this invention The bead core prepared in the toe of bead of a Uichi Hidari pair, and the carcass ply which was prolonged in both toes of bead through both the side section from the crown section, was wound around this bead core, and was moored to the toe of bead and which consists of a radial code layer, In the pneumatic tire equipped with the belt which consists of the above code layer further and the tread rubber layer arranged on the radial direction outside of this belt arranged on the crown section radial direction outside of this carcass ply (1) This tread rubber layer is formed in the outside rubber layer which consists of mutually different gum and which has been arranged on the radial direction outside, and the inside rubber layer arranged at the radial direction inside. (2) when the value of the degree of hardness Hd of the rubber of this outside rubber layer, complex-modulus E', and loss tangent tandelta is set to 100, respectively In the cross section where 70 thru/or 90, and loss tangent tandelta are [80 thru/or 100, and complex-modulus E'] 80 thru/or 110, and the degree of hardness Hd of the rubber of this inside rubber layer includes (3) tire revolving shaft the ratio of thickness d of this inside rubber layer to thickness D of this tread rubber layer -- d/D It is the radial-ply tire containing air to which this inside rubber layer is characterized by the degree which appears in a ground plane becoming large gradually as it is distributed over shaft orientations between the tread both-sides sections at the ununiformity, (4) tires run and wear of this tread rubber layer advances.
[0005] In order to attain the above-mentioned purpose, with the radial-ply tire containing air of this invention the ratio of thickness d [on a cross section including a tire revolving shaft, and as opposed to

thickness D of this tread rubber layer] of this inside rubber layer -- d/D between the tread both-sides sections the ratio of thickness d [on having two or more maximal value and minimal value or a cross section including a tire revolving shaft, and as opposed to thickness D of this tread rubber layer] of this inside rubber layer -- it is desirable that d/D is becoming small gradually toward the tread both-sides section most greatly in the tread center section.

[0006] With the conventional radial-ply tire containing air for passenger cars, since driving stability ability fell since the channel depth decreased and block rigidity increased as the tire ran and wear of a tread rubber layer advanced, and the elastic coefficient of the perpendicular direction of a tread increased, there was an inclination for the degree-of-comfort engine performance to also get worse. In the pneumatic tire of this invention, as mentioned above a tread rubber layer It is formed in the outside rubber layer which consists of mutually different gum and which has been arranged on the radial direction outside, and the inside rubber layer arranged at the radial direction inside. When the value of the degree of hardness Hd of the rubber of an outside rubber layer, complex-modulus E', and loss tangent tandelta is set to 100, respectively Since 80 thru/or 100, and complex-modulus E' are [70 thru/or 90, and loss tangent tandelta] 80 thru/or 110, the degree of hardness Hd of the rubber of an inside rubber layer Without wear of a tread rubber layer advancing in the phase in early stages of tire transit when [that a channel depth is deep] block rigidity is weak If the behavior of the outside rubber layer equipped with the above harder physical-properties values governs the behavior of a tread, wear of a tread rubber layer advances [a tire] in the phase of the transit last stage, a channel depth decreases and block rigidity increases The behavior of the inside rubber layer equipped with the above softer physical-properties values governs the behavior of a tread. The outstanding tire which kept almost constant engine performance, such as driving stability ability and degree-of-comfort engine performance, from the phase in early stages of transit to the phase of the transit last stage is obtained by this.

[0007] Furthermore, in the pneumatic tire of this invention, it sets in a cross section including a tire revolving shaft as mentioned above. the ratio of thickness d of an inside rubber layer to thickness D of a tread rubber layer -- d/D Since the degree to which an inside rubber layer appears in a ground plane becomes large gradually as it is distributed over shaft orientations between the tread both-sides sections at the ununiformity, a tire runs and wear of a tread rubber layer advances There is no possibility that the shift from the phase in early stages of transit to the phase of the transit last stage may give sense of incongruity smoothly to a line crack and a driver. the ratio of thickness d of an inside rubber layer to thickness D of a tread rubber layer -- if a tire will run, wear of the outside rubber layer of a tread rubber layer will advance, if d/D is not uneven to shaft orientations between the tread both-sides sections and is distributed over homogeneity, and an inside rubber layer is almost extensively [extensively or] exposed to a ground plane suddenly, since many tire engine performance, such as road surface grip engine performance, will change rapidly, it is not desirable. the ratio of thickness d of an inside rubber layer to thickness D of a tread rubber layer -- specifically, in order that d/D may distribute an ununiformity over shaft orientations between the tread both-sides sections the ratio of thickness d [on a cross section including a tire revolving shaft, and as opposed to thickness D of this tread rubber layer] of this inside rubber layer -- d/D between the tread both-sides sections It has two or more maximal value and minimal value, and has become the so-called wave arrangement, or the ratio of thickness d [on a cross section including a tire revolving shaft, and as opposed to thickness D of this tread rubber layer] of this inside rubber layer -- it is desirable that d/D is becoming small gradually toward the tread both-sides section most greatly in the tread center section, and serves as the so-called arrangement.

[0008]

[Embodiment of the Invention] Hereafter, the example 1 according to this invention thru/or the tire of 2, and the tire of the conventional example are explained with reference to a drawing. Each tire size is 205 / 65R15. The tire of the example 1 by this invention shown in drawing 1 The bead core 1 prepared in the toe of bead of a Uichi Hidari pair, and the carcass ply 2 which was prolonged in both toes of bead through both the side section from the crown section, was wound around the bead core 1, and was moored to the toe of bead and which consists of a two-layer radial code layer, It has the belt 3 which consists of a four-layer code layer arranged on the crown section radial direction outside of the carcass

ply 2, and the tread rubber layer 4 arranged on the radial direction outside of a belt 3. The tread rubber layer 4 is formed in the outside rubber layer 41 which consists of mutually different gum and which has been arranged on the radial direction outside, and the inside rubber layer 42 arranged at the radial direction inside. When the value of the degree of hardness Hd of the rubber of the outside rubber layer 41, complex-modulus E', and loss tangent tandelta is set to 100, respectively, for the degree of hardness Hd of the rubber of the inside rubber layer 42, 96 and complex-modulus E' are [85 and loss tangent tandelta] 105. the ratio of thickness d [on a cross section including a tire revolving shaft, and as opposed to thickness D of the tread rubber layer 4] of the inside rubber layer 42 -- d/D is distributed over shaft orientations between the tread both-sides sections at the ununiformity, it is alike, and it follows and the degree to which a tire runs and wear of this tread rubber layer advances and to which the inside rubber layer 42 appears in a ground plane becomes large gradually. namely, the ratio of thickness d [on the cross section which includes a tire revolving shaft like illustration, and as opposed to thickness D of the tread rubber layer 4] of an inside rubber layer -- d/D is becoming small gradually toward the tread both-sides section most greatly in the tread center section. That is, the interface of the outside rubber layer 41 and the inside rubber layer 42 which form the tread rubber layer 4 serves as the Yamagata arrangement. the ratio of thickness d [on the cross section where the tire of the example 2 by this invention shown in drawing 2 includes a tire revolving shaft, and as opposed to thickness D of the tread rubber layer 4] of the inside rubber layer 42 -- d/D is almost the same as the pneumatic tire of the above-mentioned example 1 between the tread both-sides sections except for having seven pieces and the eight minimal value for the maximal value. With the tire of an example 2, the interface of the outside rubber layer 41 and the inside rubber layer 42 which form the tread rubber layer 4 serves as wave arrangement.

[0009] the former -- an example -- a pneumatic tire -- tread rubber -- a layer -- four -- being single -- rubber -- a layer -- forming -- having -- **** -- the -- rubber -- a layer -- rubber -- a degree of hardness -- Hd -- a complex modulus -- E -- ' -- and -- loss -- a tangent -- tan -- delta -- a value -- the above -- an outside -- rubber -- a layer -- 41 -- rubber -- a degree of hardness -- Hd -- a complex modulus -- E -- ' -- and -- loss -- a tangent -- tan -- delta -- a value -- being the same -- things -- removing -- the pneumatic tire of the above-mentioned example 1 -- almost -- being the same .

[0010] About the example 1 according to above-mentioned this invention thru/or the pneumatic tire of 2, and the pneumatic tire of the above-mentioned conventional example, the sample offering tire at the time of a new article and 50% wear was prepared, and the comparative study of driving stability ability and the degree-of-comfort engine performance was carried out. Normal rim 6.5J-15 are equipped with a test condition, a car is equipped with the sample offering tire filled up with the normal internal pressure of 2.2kg/cm2, it runs a test course, and a test result is feeling evaluation by the test driver. It is shown that the engine performance is excellent, so that evaluation mark are large.

[0011] Although all the evaluation mark of the sample offering tire at the time of a new article were 7.0 in the test result of driving stability ability about the example 1 according to this invention thru/or the tire of 2, and the tire of the conventional example, the evaluation mark of the sample offering tire at the time of 50% wear were 6.0, 6.5, and 5.0, respectively. Although all the evaluation mark of the sample offering tire at the time of a new article were 7 in the test result of the degree-of-comfort engine performance about the example 1 according to this invention thru/or the tire of 2, and the tire of the conventional example, the evaluation mark of the sample offering tire at the time of 50% wear were 6.0, 6.5, and 5.5, respectively.

[0012]

[Effect of the Invention] The above-mentioned evaluation result shows that the pneumatic tire of the example based on this invention is kept almost constant [engine performance, such as driving stability ability and degree-of-comfort engine performance,] from the phase in early stages of transit to the phase of the transit last stage, without driving stability ability's falling extremely or the degree-of-comfort engine performance getting worse extremely even if a tire runs and wear of a tread rubber layer advances compared with the pneumatic tire of the conventional example.

[Translation done.]

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CLAIMS

[Claim(s)]
[Claim 1] The bead core prepared in the toe of bead of a Uichi Hidari pair, and the carcass ply which was prolonged in both toes of bead through both the side section from the crown section, was wound around this bead core, and was moored to the toe of bead and which consists of a radial code layer, In the pneumatic tire equipped with the belt which consists of the above code layer further and the tread rubber layer arranged on the radial direction outside of this belt arranged on the crown section radial direction outside of this carcass ply (1) This tread rubber layer is formed in the outside rubber layer which consists of mutually different gum and which has been arranged on the radial direction outside, and the inside rubber layer arranged at the radial direction inside. (2) when the value of the degree of hardness Hd of the rubber of this outside rubber layer, complex-modulus E', and loss tangent tandelta is set to 100, respectively In the cross section where 70 thru/or 90, and loss tangent tandelta are [80 thru/or 100, and complex-modulus E'] 80 thru/or 110, and the degree of hardness Hd of the rubber of this inside rubber layer includes (3) tire revolving shaft the ratio of thickness d of this inside rubber layer to thickness D of this tread rubber layer -- d/D The radial-ply tire containing air to which the degree to which this inside rubber layer appears in a ground plane is characterized by becoming large gradually as it is distributed over shaft orientations between the tread both-sides sections at the ununiformity, (4) tires run and wear of this tread rubber layer advances.
[Claim 2] the ratio of thickness d [on a cross section including a tire revolving shaft, and as opposed to thickness D of this tread rubber layer] of this inside rubber layer -- the radial-ply tire containing air according to claim 1 to which d/D is characterized by having two or more maximal value and minimal value between the tread both-sides sections.
[Claim 3] the ratio of thickness d [on a cross section including a tire revolving shaft, and as opposed to thickness D of this tread rubber layer] of this inside rubber layer -- the radial-ply tire containing air according to claim 1 characterized by d/D becoming small gradually toward the tread both-sides section most greatly in the tread center section.

[Translation done.]